Strategies for the prevention and management of obesity in the pediatric population: A literature review

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ABSTRACT

Introduction: Overweight and obesity are conditions that have been increasing considerably in the pediatric population. Overweight and obesity are known to be associated with the development of systemic arterial hypertension (SAH), heart disease, osteoarthritis, type 2 diabetes, and some cancers in adulthood. In addition to the expected clinical problems, it is known that obese people, and especially children, often have problems with low self-esteem, affecting school performance and relationships Objective: To analyze and synthesize the most recent research on obesity prevention and management strategies in the pediatric population, in order to identify the consequences of non-treatment and the most effective approaches. Methodology: The searches were carried out in the PUBMED and LILACS databases, using the search process through vocabulary controlled through descriptors and Boolean operators "and" and "or". Conclusion: Addressing childhood obesity requires comprehensive measures, including improvements in quality of life, promotion of healthy eating, encouragement of physical activity, family support, consideration of bariatric surgery in severe cases, and, occasionally, use of medication measures. By adopting an integrated strategy, it is possible to effectively address this health challenge, promoting healthy habits from childhood for a more balanced future.

Keywords: Pediatric Obesity, Prevention, Intervention.

1 INTRODUCTION

According to the description of the World Health Organization, obesity refers to the presence of an excessive accumulation of body fat at levels that result in adverse health impacts, and the body mass index (BMI) is one of the most effective measures to delineate the degree of obesity of individuals.

Body mass index (BMI) is a classification method that seeks to facilitate the comparison of weights in different populations, regardless of height. Its formula consists of dividing body weight (in kilograms) by height (in meters, squared).

Weight gain is the result of a balance between energy intake and energy expenditure. Weight gain occurs when energy consumption is greater than energy expenditure. Weight loss occurs with restricted energy intake, increased energy output, or both. However, this simple model fails to incorporate what are now known as complex homeostatic systems, which counterbalance voluntary energy disturbances, whether they are forced overfeeding, caloric restriction or increased activity. (RANKINEN, 2006)

A homeostatic model of weight regulation is theoretically identical to other tightly regulated systems in the body, such as systems for maintaining glucose levels and blood pressure. Each system involves perceiving and responding to environmental changes, including lifestyle changes related to activity and diet. For example, glucose levels are maintained within a narrow normal range, even in the face of the wide daily fluctuations in calorie intake that occur during meal intake, overnight fasting, and exercise, due to the action of complex and integrated responses, which include insulin, glucagon, catecholamines, cortisol, growth hormone and central nervous system. (MORTON, 2006)

Like glucose, body weight is regulated at multiple levels in order to maintain a normal range (or set) through the interaction between the systems that control meal-by-meal intake (satiety) and those that control relative adipose mass (adiposity). (MORTON, 2006)

Overweight and obesity are conditions that have been increasing considerably. Overweight and obesity are known to be associated with the development of systemic arterial hypertension (SAH), heart disease, osteoarthritis, type 2 diabetes, and some cancers in adulthood. About 50% of obese children at 6 months of age, and 80% of obese children at 5 years, will remain obese. (TROIANO, 1995) (GORTMAKER, 1987)

The fact that obese children tend to remain with the same condition in adulthood is one more reason for family physicians to be aware of this epidemiological change and include the prevention of overweight/obesity in their care routine.

In addition, high blood pressure is a pathological process that can start in childhood. In addition to the expected clinical problems, it is known that obese people, and especially children, often have problems with low self-esteem, affecting school performance and relationships. (KLEIGMANL, 2004)

There are several factors that are related to the state of overweight and obesity, ranging from genetic issues that can induce greater or lesser energy gain/expenditure, to lifestyle habits that favor weight gain. Individual issues, such as specific diseases and the use of medications, can favor the onset of the disease. However, only 5% of childhood obesity is associated with diseases such as Cushing's, Turner's, muscular dystrophy, among others. (MONTE, 2006)

Other authors mention that obesity of organic causes in childhood corresponds to 1% of cases, and 99% are of exogenous origin, mainly due to an increase in the intake/expenditure ratio. (SUCUPIRA, 2010).

2 OBJECTIVE

The objective of this literature review is to analyze and synthesize the most recent research on obesity prevention and management strategies in the pediatric population, in order to identify the consequences of non-treatment and the most effective approaches, as well as to provide a solid theoretical basis for future interventions and development of measures to prevent childhood obesity.

3 MATERIALS AND METHODS

3.1 DATABASES

The searches were carried out in two bibliographic databases — PubMed and LILACS. At the end of the searches in each database, the duplicate references were excluded.

3.2 TIME LIMIT

Articles published between 2015 and 2023 (including those available online in 2023 that could be published in 2024) were selected

3.3 LANGUAGES

Articles written in English and Portuguese were selected.

3.4 DESCRIPTORS

The search process was used through vocabulary controlled through descriptors and Boolean operators "and" and "or". With this strategy, there was a recovery of specific references, ensuring the detection of most of the published works within the pre-established criteria.

The descriptors used were "Pediatric*" and "Obesity",* were combined with the "and" operator and the descriptors *"Management" and* "Primary Prevention" *were combined with the descriptor "*or". As the objective of the present review was not to assess obesity in other age groups, the term was specific in "Pediatric" in the search.

3.5 INCLUSION AND EXCLUSION CRITERIA

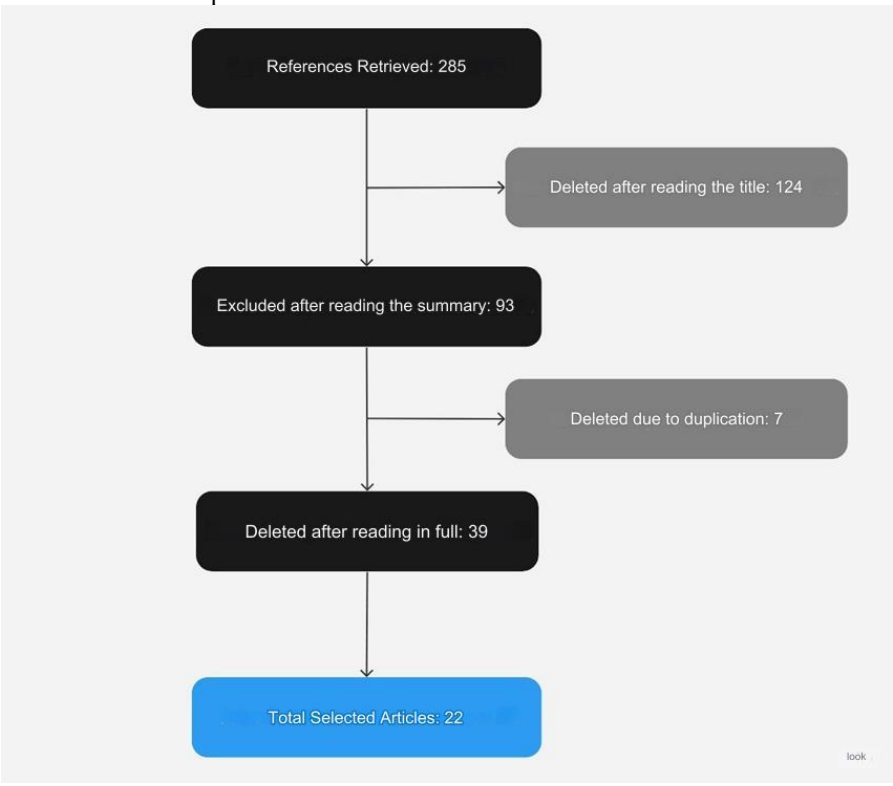
All original articles indexed in the period between January 1, 2015 and November 10, 2023, with experimental design (clinical trials, randomized or not) or observational design (case-control studies, cohort studies, and before and after studies) were included. Articles that analyzed observational

studies with cross-sectional analysis, phase I or II studies, and studies conducted in pregnant patients were excluded.

3.6 ARTICLE SELECTION AND ANALYSIS PROCESS

Figure 1 shows the process of selecting articles in its different stages and the respective number of articles retrieved in each one. The captured references were included in a unique library in the Zotero program. Two medical students were responsible for selecting and reading the selected articles in full; After the selection, a library was created in which all the selected references and the respective complete articles in PDF format were listed. A total of 22 original articles were included in this review (Figure 1).

Figure 1 - Flowchart of the selection process of the researched articles. The number of items in each stage is indicated.



Source: The Authors.

4 DISCUSSION AND RESULTS

4.1 EPIDEMIOLOGY

Childhood obesity affects 13.2% of children between 5 and 9 years of age monitored by the Unified Health System (SUS) of the Ministry of Health, and can have worrying consequences throughout life. In this age group, 28% of children are overweight, a warning sign of the risk of obesity in childhood or in the future. Among children under 5 years of age, the overweight rate is 14.8, and 7% are already obese. The data are from 2019, based on the Body Mass Index (BMI) of children who are cared for in Primary Health Care (SAPS). (BRAZIL, 2021)

Obesity in children and adolescents is multifactorial. Genetic, individual, behavioral, and environmental conditions can influence nutritional status. The public report of the National Food and Nutrition Surveillance System, with data from people monitored in Primary Health Care, points out that, by mid-September 2022, more than 340 thousand children aged 5 to 10 years had been diagnosed with obesity. In 2021, PHC diagnosed obesity in 356 thousand children of the same age. (BRAZIL, 2022)

Currently, the South region has 11.52% of obese children in this age group, the highest rate in the country. It was followed by the Southeast, with 10.41%; Northeast, with 9.67%; Midwest, with 9.43%; and North, with 6.93% of children monitored by the Unified Health System (SUS) in the region. (BRAZIL, 2022)

4.2 CLASSIFICATION OF CHILDHOOD OBESITY

Body Mass Index (BMI) is a widely used tool for assessing overweight and obesity in children, employing a specific approach that takes into account the age of the individual. When calculating BMI for age, standard growth charts are used, which take into account normal variations in children's development. The result is compared with specific percentiles to determine the relative position of the child in relation to the general population.

Interpretation of children's BMI often involves the use of percentiles or z-scores, which indicate how far a child's BMI is from the mean for their age. Higher percentiles may suggest that you are possibly overweight. In addition, converting BMI to z-scores allows adjusting for natural variability in child growth. Positive z-score values indicate an above-average BMI, while negative values indicate a below-average BMI for the child's age. (ALMEIDA, 2018)

It is crucial to recognize that BMI-for-age also takes into account differences between the sexes, since boys and girls may have distinct growth patterns. Sex-specific growth charts make it possible to assess the child's development more accurately, taking into account the biological particularities of each gender. Thus, the use of BMI for age, percentiles/z-score and differentiation by sex offers a comprehensive approach to the assessment of children's nutritional status, providing valuable information for prevention and intervention in cases of overweight and obesity. (ALMEIDA, 2018)

4.3 PHYSIOPATHOLOGY

The pathophysiology of obesity is intrinsically linked to the endocrine role of adipose tissue, transcending its nature merely as a reservoir of energy to manifest itself as a dynamic secretory organ. This adipose organ expresses receptors responsive to both the hormonal systems and the central nervous system (CNS).

Concisely, several mechanisms associated with obesity are closely related to insulin resistance and metabolic syndrome, intertwining in a significant portion of obese patients. The accumulation of fat in the intra-abdominal organs favors insulin resistance and dyslipidemia, while the accumulation of visceral fat, assessed by measuring abdominal circumference, emerges as a robust marker of predisposition to metabolic syndrome in adulthood. This phenomenon not only affects metabolic disorders, but also plays a crucial role in arterial thickening, predisposing to atherosclerosis. (GUYTON, 2021)

Additionally, increased visceral fat correlates with other pathological conditions, such as sleep apnea, hepatic steatosis, polycystic ovary syndrome, and hyperandrogenism. (GUYTON, 2021)

4.4 LIFESTYLE HABITS

Several elements have an impact on children's eating habits, being understood both by external factors, which include family dynamics and their particularities, attitudes manifested by parents and friends, values rooted in the social and cultural sphere, the influence of the media, the presence of fast-food consumption, nutritional knowledge and established eating patterns, as well as by internal factors, which include psychological needs and characteristics, body image perception, intrinsic values and personal experiences, self-esteem, food preferences, health and ongoing psychological development.

There are well-studied aspects in relation to eating habits that are more related to obesity. Breastfeeding is touted to be an important protective factor against obesity. However, habits such as not eating breakfast, eating dinner consuming a large amount of calories, eating a limited variety of foods and preparations and in large portions, consuming too much light but caloric liquids and having an inadequate practice of early eating are harmful and inducing obesity. (MELLO, 2004)

Exercise is considered a category of planned, structured, and repetitive physical activity. Physical fitness, in turn, is a characteristic of the individual that encompasses aerobic power, strength, and flexibility. The study of these components can help in the identification of children and adolescents at risk of obesity. Children and adolescents tend to become obese when they are sedentary, and obesity itself can make them even more sedentary (YANOVSKI, 2002).

Physical activity, even if spontaneous, is important in body composition, as it increases bone mass and prevents osteoporosis and obesity. Sedentary habits, such as watching television and playing video games, contribute to a decrease in daily caloric expenditure. (MATSUDO, 2003). In a study, they observed a significant decrease in the rate of resting metabolism while children watched a certain television program, being even smaller in obese women. So, in addition to the metabolic expenditure of daily activities, resting metabolism can also influence the occurrence of obesity. Increasing physical activity, therefore, is a goal to be followed, accompanied by a decrease in food intake. With physical activity, the individual tends to choose less caloric foods. (KLEGES. 1993)

4.5 STRATEGIES AND MANAGEMENT FOR THE PREVENTION OF CHILDHOOD OBESITY

Today, there are several ways of presenting both numerical and linguistic data. Therefore, the use of tables brings several benefits such as conserving and restricting data loss, greater specificity and, in addition, provides a better analysis of the data since they are grouped in order, allowing comparisons and conclusions to be made.

Table 1 presents this article to demonstrate the strategies and management methods for the prevention of childhood obesity. Thus, Table 1 summarizes the results and discussions that the authors of their respective articles carried out during their research.

Table 1: Analysis of the results of the articles

Pediatric Obesity-Assessment, Treatment, and Prevention: An Endocrine Society Clinical Practice Guideline	The use of weight loss drugs during childhood and adolescence should be restricted to clinical trials. Growing evidence demonstrates the efficacy of bariatric surgery in the most severely affected mature adolescents who have not been able to modify their lifestyle, but the use of the surgery requires experienced teams with resources for long-term follow-up.
Pediatric obesity: prevention is better than care	A multi-component intervention, addressing different targets and contexts, may be desirable, but further studies are needed to confirm long-term efficacy and to guide policy interventions.
Obesity in children and adolescents: epidemiology, causes, assessment, and management	Evidence is emerging of intensive dietary approaches, pharmacotherapy, and metabolic and bariatric surgery as supplemental therapies; However, access to these therapies is scarce in most jurisdictions.
Addressing Childhood Obesity: Opportunities for Prevention	Public policies and environmental interventions aim to make it easier for children to choose a healthy diet and physical activity. Interventions focusing on family habits and parenting strategies have also been successful in preventing or treating childhood obesity.
Overweight and obesity in children and adolescents	Currently, pharmacotherapy options for the treatment of pediatric obesity are very limited. Therefore, it is crucial to establish a comprehensive management program that emphasizes proper nutrition, exercise, and behavioral modification.
Prevention and Management of Childhood Obesity and Its Psychological and Health Comorbidities	Clinical health psychologists are ideally suited to conduct research on this complex problem, but transdisciplinary teams will be needed to increasingly change control.
Pediatric Obesity: Primary Care Perspective and Prevention	Pediatricians and primary care providers are instrumental in treating overweight and obesity. They have the advantage of observing children over a long period of time, having a family-centred perspective and often being seen as a reliable source of information.
Progress in pediatric obesity: new and advanced therapies	Promising new medical and surgical therapies and screening tests for rare genetic causes of obesity are available. These new diagnostic and therapeutic options bring renewed enthusiasm to the treatment of children and adolescents with obesity and increase the recognition that obesity is a chronic disease that begins in childhood and deserves intervention to prevent consequences.

Dietary Interventions to Prevent Childhood Obesity: A Literature Review	Overall, most intervention studies have shown consistent effects on changing children's body mass index; They reported weight reductions, which were clinically relevant to the obesity reduction outcome.
Childhood obesity: causes, consequences and solutions	The identification of the main causal factors will facilitate, from primary, specialized and population-level care, a more adequate and concrete response to childhood and adolescent obesity.
Obesity and Children	Pediatric nurses are respected and positioned to present evidence-based obesity education, correct common myths about obesity, sensitively address obesity-related biases and discrimination, and model person-first language and actions.
Risk Factors and Implications of Childhood Obesity	Restructuring anti-obesity interventions towards community-based/environmentally-oriented measures to counteract an obesogenic environment is mandatory for sustainable success and to halt the obesity epidemic
Child and adolescent obesity	A respectful, stigma-free, family-based approach involving multiple components and addressing eating, physical activity, sedentary and sleep behaviors. Especially in adolescents, adjunctive therapies can be valuable, such as more intensive dietary therapies, pharmacotherapy, and bariatric surgery.
Childhood obesity: increased risk for cardiometabolic disease and cancer in adulthood	Normalization of body weight before the onset of puberty is crucial for several reasons. Obese children and adolescents often remain obese until adulthood, requiring adequate diet and physical exercise.
Childhood obesity: an ecological perspective	Environmental aspects should be taken into account in the prevention and treatment of childhood obesity, both from an individual and population point of view, with adequate and comprehensive public health policies.
The adolescent with obesity: what perspectives for treatment?	The risks of bariatric surgery include the need for additional abdominal surgical procedures and specific micronutrient deficiencies. Hopefully, new pharmacological treatments, in addition to lifestyle interventions, will offer more chances of success.
Childhood Obesity	Medications and bariatric surgery can play a role in certain severe cases. Community and policy changes regarding diet and physical activity can facilitate practical strategies against the growing obesity epidemic.
Childhood obesity: Aetiology, comorbidities, and treatment	Pharmacological and non-pharmacological management through lifestyle changes and relevant aspects of bariatric surgery in the pediatric population are effective measures in the management of children with obesity.
Pediatric Obesity-A Looming Problem for the Pediatric Population	Primary care physicians are the agents of change, as promoters of healthy habits, challenged to involve families and communities in health and in the movement of good nutrition and adaptation of good habits, and not in overabundance and stagnation.
Obesity in Childhood and Adolescence, Genetic Factors	An increasing number of genes and genetic mechanisms in children continue to be discovered. This sheds new light on the molecular mechanisms of obesity and potentially provides a target for new forms of treatment.
The association between adverse childhood experiences and childhood obesity: A systematic review	Taken collectively, the results suggest the need for greater attention to adverse childhood experiences in the prevention and treatment of childhood obesity.

Obesity in Children	It is important to review optimal care in both primary care and multidisciplinary weight management settings. This allows for timely evaluation and appropriate referrals, with the pediatrician playing a key role in advocating for the most at-risk patients.

Source: Own Authorship

5 CONCLUSION

Childhood obesity is a growing concern globally, with significant public health implications. In this literature review, we address the points associated with changes in quality of life in children facing this health challenge. Addressing childhood obesity goes beyond aesthetics, involving the promotion of healthy eating habits and the incorporation of regular physical activity. Taking a holistic approach to improving the quality of life of obese children is crucial.

Improved diet is a key aspect in the management of childhood obesity. Interventions that promote nutrition education, encourage healthy food choices, and restrict access to ultra-processed foods have been shown to be effective in preventing and treating obesity. In addition, strategies that involve raising awareness about adequate portions and the importance of a balanced diet contribute to a positive change in children's eating patterns.

Encouraging early initiation of physical activity is another key element in addressing childhood obesity. Programs that promote regular physical activity not only aid in weight loss but also have positive impacts on children's cardiovascular health, muscle development, and mental health. It is imperative to engage children in physical activities that are age-appropriate, fun, and encourage the formation of long-term active habits.

The support of family members plays a crucial role in tackling childhood obesity. Effective strategies often involve family changes, such as creating healthy home environments, establishing eating routines, and actively participating in physical activity together with children. Fostering a health-centered family culture contributes to long-term success in managing childhood obesity.

For more severe cases of childhood obesity, bariatric surgery appears as an effective option. This approach is considered when other measures fail to achieve sustainable results. However, it is essential that the decision for surgical interventions is based on a comprehensive assessment, considering factors such as the child's overall health, development, and ongoing family support.

Drug measures may also be considered in certain scenarios, under strict medical guidance. However, it is crucial to highlight that the use of medications should be an integral part of a multifaceted approach, which includes lifestyle changes and psychosocial support.

In conclusion, addressing childhood obesity requires a comprehensive response, incorporating changes in quality of life, improved diet, initiation of physical exercise, support from family members, surgical interventions for severe cases and, in certain contexts, medication measures. By taking an

integrated approach, we can work to reverse the trend of childhood obesity and provide a healthier future for generations to come.

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